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PAPERS

IN

MANUFACTURES.

MANUFACTURES.

The GOLD MEDAL *of the Society was this Session voted to* MR. JOHN AUSTIN, *of Glasgow, for a* LOOM *to be* WORKED *by* STEAM *or* WATER.

The following Communication was received from him, and a complete Working-Model is preserved in the Society's Repository.

SIR,

AFTER much trouble, expense, and reiterated experiments, I have happily succeeded in completing a new WEAVING-LOOM, a Working-Model of which, with cloth in it, is presented to the Society for their inspection. It has, upon trial, succeeded beyond expectation, answers in every respect the purpose for which it is intended, and has met with the approbation of manufacturers of the first respectability in the country.

After many different attempts, I think that I have brought my weaving-loom, which may be driven by water, or steam, to such a state of perfection, as to prove its utility, the more it is known and employed.

My first attempt was made in the year 1789: I at that time entered a caveat for a patent, but relinquished the idea of obtaining one, and have since made many improvements upon my original plan. In 1796 a report in its favour was made by the Chamber of Commerce and Manufactures at Glasgow; and in the year 1798, a loom was actually set at work, at Mr. J. Monteith's spinning-works, at Pollockshaws, four miles from Glasgow, which answered the purpose so well, that a building was erected by Mr. Monteith, for containing thirty looms, and afterwards another to hold about two-hundred.

The model now submitted for inspection, is an improvement upon those constructed for Mr. Monteith.

The following advantages which my Loom possesses, I beg leave to lay before the Society.

1. That from 300 to 400 of these looms may be worked by one water-wheel, or steam-engine, all of which will weave cloth, superior to what is done in the common way.

2. That they will go at the rate of sixty shoots in a minute, or two yards of a nine-hundred web in an hour.

3. That they will keep regular time in working, stop, and begin again, as quick as a stop watch.

4. They will keep constantly going, except at the time of shifting two shuttles, when the weft on the pirns is done,

5. In general, no knots need to be tied, and never more than one, in place of two, which are requisite, in the common way, when a thread breaks.

6. In case the shuttle stops in the shed, the lay will not come forward, and the loom will instantly stop working.

7. They will weave, proportionally slower, or quicker, according to the breadth and quality of the web, which may be the broadest now made.

8. They may be mounted with a harness, or spot heddles, to weave any pattern, twilled, striped, &c.

9. There is but one close shed, the same in both breadths, and the strain of the working has no effect on the yarn behind the rods.

10. The bore and temples always keep the same proper distance.

11. There is no time lost in looming, or cutting-out the cloth; but it is done while the loom is working, after the first time.

12. The weft is well stretched, and exactly even to the fabric required.

13 Every piece of cloth is measured to a straw's breadth, and marked where to be cut, at any given length.

14. The loom will work backwards, in case of any accident, or of one or more shoots missing.

15. Every thread is as regular on the yarn beam as in the cloth, having no more than two threads in the runner.

16. If a thread should appear too coarse or fine in the web, it can be changed, or any stripe altered at pleasure.

17. They will weave the finest yarn, more tenderly, and regularly, than any weaver can do with his hands and feet.

18. When a thread either of warp or weft breaks in it, the loom will instantly stop, without stopping any other loom, and will give warning by the ringing of a bell.

19. A loom of this kind occupies only the same space as a common loom; the expense of it will be about half more; but this additional expense is more than compensated by the various additional machinery, employed for preparing the yarn for the common loom, and which my loom renders entirely unnecessary.

20. The reeling, winding, warping, beaming, looming, combing, dressing, fanning, greasing, drawing bores, shifting heddles, rods and temples, which is nearly one-half of

the weaver's work, together with the general waste accompanying them, which is about six per cent. of the value of the yarn, and all which occur in the operations of the common loom, do not happen with my loom, which, by its single motion, without further trouble, performs every operation after the spinning, till the making of the cloth be accomplished; by which, independent of the saving of the waste, the expense incurred for reeling, warping, winding, &c. is saved, amounting to above twenty per cent. of the yarn.

21. The heddles, reed, and brushes, will wear longer than usual, from the regularity of their motion.

22. More than one-half of workmanship will be saved: one weaver and a boy being quite sufficient to manage five looms of coarse-work, and three or four in fine-work.

These advantages, which from experience my weaving-loom has been found to possess, and which upon inspection will be perceived, will, I presume, be esteemed of some magnitude.

My loom as now constructed and improved, is much simplified, so that the manual labour requisite is trifling; and if it is encouraged by the Society of Arts, I am sensible much advantage will arise from their approbation, and the publicity it will in consequence receive.

I am, Sir,
Your humble servant,
JOHN AUSTIN.

London, Feb. 19, 1806.
To Dr. C. Taylor.

Certificates were produced from Messrs. Hugh Cross, Matthew Persten, and David Mutrie, dated Glasgow, October 12, 1796, stating that, by appointment of the Chamber of Commerce in Glasgow, they had inspected the Loom constructed by Mr. Austin, and were of opinion, that it will be found to contain some ingenious and useful improvements, by producing saving and facility in several of the ordinary operations.

Messrs. NEIL, MACVICAR, and THOS. HENDERSON, of Edinburgh, certified on the 12th of April, 1804, that they had seen, in the Trustee's office there, the model of Mr. Austin's Loom, and that they thought it ingenious, and the best they had then seen.

Further Certificates from Edinburgh, dated April 14, 1804, from Mr. JOHN DRUMMOND, and from Messrs. JAMES REID and JOHN WAUGH, partners in the house of WALTER BIGGER and Co. linen-manufacturers, testify to the ingenuity of Mr. Austin's Loom, and that it is capable of being employed to the great advantage of the manufactures of this country.

Mr. AUSTIN having left a complete Working-Model o. his Loom with the Society of Arts, &c. a reference to it will convey an idea of its principles, better than any description that might be attempted; as from the variety of minute parts in it, the Committee of the Society have thought it impossible to have a drawing of it, upon their usual scale, which can be rendered sufficiently intelligible.

TWENTY GUINEAS *were this Session voted to* Mr. J. ROBERTSON *of St. Mary's Wind, Edinburgh, for a* LOOM *for* WEAVING FISHING-NETS.

The following Communication was received from him, and an Engraving is annexed. A Model of the Loom is placed in the Society's Repository.

SIR,

A MACHINE for weaving nets has long been a desideratum in the arts. Fishermen experience many difficulties from their nets being frequently broken by dog-fish, and other marine animals, and the consequent length of time, required by the present mode of netting, in repairing their injured nets, or in making others. A fisherman is sometimes compelled, from such accidents, to relinquish fishing for a whole season. Any method, therefore, which leads to accelerate the fabrication of nets, without increasing the expense of them, must be beneficial to the community.

From this consideration, I have paid great attention to the subject, and now submit to the Society a model which, it is presumed, will answer the purpose held in view, of expediting net-work, while, so far from increasing the expense of them, it will diminish it.

I have, indeed, to regret, that from my obligation to provide, by my own manual labour, for a numerous family, I have been unable to establish the utility of the invention, by the experience of an extensive scale. I am, nevertheless, convinced, that the invention is better adapted for the object in question, than any which has hitherto been proposed. As such, I humbly lay it before the Society of Arts, &c. and am,

Sir,
Your obedient servant,
JOHN ROBERTSON

Edinburgh, June 12, 1801.
To Dr. C. TAYLOR.

Mr. Robertson's Loom for making Fishing Nets.

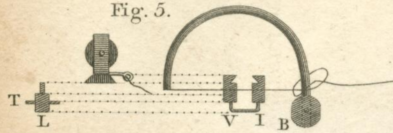


Fig. 5.

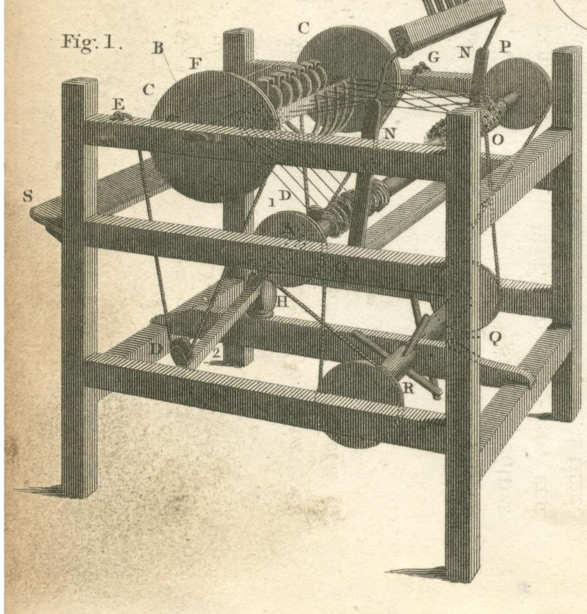
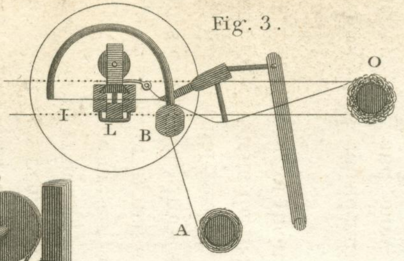


Fig. 1.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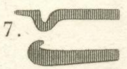
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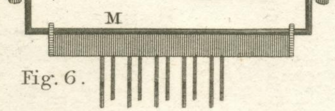
Fig. 6.

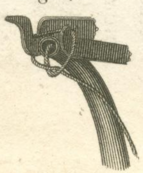
Fig. 4.

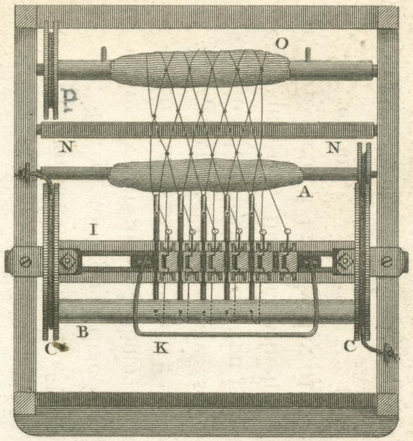
Fig. 2.

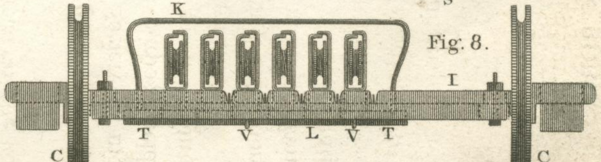
Fig. 8.

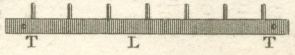
Fig. 9.

Reference to the Engraving of Mr. Robertson's Loom for Weaving Fishing-Nets. Plate III. Fig. 1 *to* 9.

Fig. 1. Is the machine in a state ready to begin working, supported in a wooden frame. A is a beam, on which the twines for the net is rolled, in number equal to the knots tied, and from which it passes through circular tubes fixed in a bar, B (shown by dotted lines through the pulley, but seen better Fig. 2) which is fixed near the circumference of two equal pullies C, C, that turn on their axis by means of a cross-treadle, with small pullies at each end, D, D, through which passes a band, one end of which is fastened on the frame at E, and the other on the pully C. At F, the band through the other pulley has one end fastened on the frame at G, and being wound round the farthest pulley C, is fastened on the under side of it, which by the alternate action of the traddle on its axis H, moves the pullies C, C, and circular tubes from their situation in Fig. 1, to that in Fig. 3, and back again. In the centre of the pullies C, C, is fixed another bar P with a dove-tail groove, where the pirns that contain the twine are supported, (it being necessary to have two threads for every mesh, also one pirn more than there are tubes). In a groove under the dovetail is a slider L, moved by a wire K, fixed in each end of it, having pins in it, by which it moves the pirns backwards or forwards over the notches in the bar I, so as to cast a part of the knot: the pulliesC, C, and bar B move round the bar I as an axis, but independant of it, the bar I being fastened through the pullies to the frame. M is a moveable bar (centred within two supporters N, N, having two joints) with hooks, both for catching the twine at the end of the circular tubes, and by crossing the hooks to the other side of the points of the tubes, will give the twine a turn for forming the knot, and by raising the points of the

hooks the ends of the tubes enter between them, as shown Fig. 4: and by the circular motion of the bar B, when the two pullies C, C, are turning on its centre by the foot, on the end, No. 1, of the cross-traddle, and until the knots so formed are close to bar B, Fig. 3, (it is then what we call a running knot) a part of which falls into a notch cut below the level of the supporters of the pirns in the bar I, then slide the pirns over the notches that contain the twine, the knot is then cast, and then by the foot on the other end, No. 2, of the cross-traddle, until the points of the tubes are returned to its former position, then remove the knot by disengaging the hooks and the tubes, then the knots are made tight as the wrought-part of the net is rolled on beam, O, on one end of which there is a pulley, P, with a band that communicates with the pulley, on the end of a short roller, Q, in which are fixed four cross bits of wood that answer the purpose of treadles for the feet, by which it is drawn tight. R is another short roller communicating with the roller A, serving to give out the proper quantity of twine for the length of the meshes, or to hold it while the other roller tightens the knot. S is the seat.

Fig. 2. Is a plan of the machine, the moveable bar and treadles left out to prevent confusion.

Fig. 3. Is the situation of the running knot when the pirn goes through it.

Fig. 5. Is the tube in the same position, showing the manner the knot is twisted round it; and having the pirn and slider L taken out of the bar I, the dotted lines showing at what height they come together. In the slider L there are two pins, T T, to prevent its rising high enough to touch the string; and in the bar I there are two wires O O, like staples, to support the slider L in its place.

Fig. 6. Is the moveable bar M with the hooks.

Fig. 7. Is the hooks at large.

Fig. 8. Is the bar I, showing the notches in which the strings lay, to let the pirns pass over them, (when the tubes are brought over as in Fig. 3).

Fig. 9. Is the slider L, with the pins that move the pirns.

SIR,

Mr. John Robertson, stocking weaver here, having lately communicated to the Highland Society of Scotland your letter to him of the 6th April, 1805, together with a model of his machine for weaving fishing nets, I have been desired by the directors to recommend him to the notice of the Society of Arts, &c. and to mention that if his invention can be made practically useful, it will most materially contribute to the extension of the fisheries, by cheapening the expence of outfit.

Although improvements in the mechanic arts do not fall within the plan of their Institution, yet the Highland Society have given Mr. Robertson a few guineas, to enable him to attend personally on the Society of Arts, &c. and to explain his machine.

I am, Sir,
Your most obedient Servant,
D. MACLACHLAN, Secretary.

Highland Society Hall, Edinburgh,
March 26, 1806.

To C. Taylor, M. D.

From Mr. Robertson's subsequent statement to the Committee of the Society of Arts, &c. it appears that the nets used in the northern fisheries are of one breadth throughout. He supposes he could make three courses of one hundred meshes each in one minute; that such a loom should be about 3½ feet wide, and would cost about fifteen or sixteen pounds.

A Certificate from Sir John Sinclair stated that Mr. Robertson's invention was much approved of in Scotland, and that he trusted it would be found entitled to the patronage of the Society of Arts, &c.

FIFTEEN GUINEAS *were this Session voted to* Mr. WILLIAM NEVEN, *Barrack Court, Woolwich, for* WEAVING CLOTH *of extremely fine quality.*

The following Communications were received from him, and Samples of the Cloth are preserved in the Society's Repository.

SIR,

PERMIT me to inform you that I have discovered an improvement in the art of weaving, which certainly will turn out a great national advantage.

By this improvement cotton, linen, and silk goods, can be made much sooner and finer, than by any method yet discovered. Upon this principle I have made a small piece of plain silk cloth, from hard thrown silk in the gum, that contains the amazing quantity of 65,536 meshes in one square inch, a number infinitely more than in any other cloth ever before made.

It is impossible for any reed-maker to make a reed half so fine as to weave such cloth upon the present principles of weaving; and even if that could be done, no weaver could make use of it: but by my method, I weave as fine cloth in a twelve hundred reed as by the present method in one of twenty-four hundred, and with rather less than more trouble.

I have sent specimens of both silk and cotton cloth, woven upon this principle, and material advantage may be derived from this plan in making cambrics, muslins, &c.

There are two specimens of cotton cloth sent: the coarse or barred kind is the cloth as it comes from the loom, and is converted into the finer specimen before it goes to the bleach field.

In the silk cloth you will see the state in which it comes from the loom, and my improvement thereof, all in the same piece; a circumstance which must be convincing. Respecting the method of doing it, I can instruct any person whatever in two minutes.

I hope the Society will find this improvement deserving of a premium, &c.

And I remain, Sir,
Your obedient Servant,
WILLIAM NEVEN.

No. 19, *Barrack Court, Woolwich,*
April 15, 1806.

To C. TAYLOR, M. D.

Mr. NEVEN explained to a Committee of the Society, that his improved mode consists upon adding more thread of the warp within each dent or split of the reed than in the common way; for instance, that where in the common mode there are only two threads in the reed, there are upon his plan three or four.

The weft or shoot is thrown in the common way with a single thread.

When the cloth is woven and taken out of the loom, it has the appearance of being barred or striped, the cane of the reed occasioning that part of the cloth struck with it to look thinner, owing to the threads of the warp being further apart.

The

The cloth is then to be wet in water, and in that state to be repeatedly stretched across by the hands backwards and forwards corner ways; by this means the threads, which apparently formed the stripe, or close part of the cloth, separate from each other, and become diffused at equal distances. The appearance of stripes being entirely removed, the cloth becomes of inconceivable fineness, and extremely regular in texture. This operation must in cotton fabrics be performed before the cloth goes to the bleach-ground.

Silk goods, on being taken out of the loom, must be wet and well rubbed, as in the common mode of washing, and then stretched backwards and forwards, as in the manner above directed for cotton goods.

In silk goods the warp and weft may be both alike; in cotton goods the weft may be softer, but of the same fineness.

Mr. Neven stated, that fine linen cambrics may be made on this plan, much superior to any hitherto made in France.

That though there are three threads within each dent, or split of the reed, whilst the cloth is weaving, yet the headles or yealds lift up the threads alternately throughout the whole breadth of the cloth, and that there are about 250 shoots in an inch.